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| | |
|---|--|
| UTILITY PATENT APPLICATION TRANSMITTAL | |
| (Only for new nonprovisional applications under 37 C.F.R. § 1.53(b)) | |
| APPLICATION ELEMENTS | |
| See MPEP chapter 600 concerning utility patent application contents. | |
| 1. <input checked="" type="checkbox"/> Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing) | |
| 2. <input checked="" type="checkbox"/> Specification [Total Pages 28] (preferred arrangement set forth below) <ul style="list-style-type: none"> - Descriptive title of the Invention - Cross References to Related Applications - Statement Regarding Fed sponsored R & D - Reference to Microfiche Appendix - Background of the Invention - Brief Summary of the Invention - Brief Description of the Drawings (if filed) - Detailed Description - Claim(s) - Abstract of the Disclosure | |
| 3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 5] | |
| 4. Oath or Declaration [Total Pages 1] <ul style="list-style-type: none"> a. <input checked="" type="checkbox"/> Newly executed (original or copy) b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 16 completed) i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b). | |
| [NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATUS IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).] | |

| | |
|--|--------------------------------------|
| Attorney Docket No. | RCA 89,041 |
| First Inventor or Application Identifier | Schneidewend et al. |
| Title | A System For Processing Programs And |
| Express Mail Label No. | EL213822368US |

Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

5. Microfiche Computer Program (Appendix)
 6. Nucleotide and/or Amino Acid Sequence Submission
 (if applicable, all necessary)

- a. Computer Readable Copy
- b. Paper Copy (identical to computer copy)
- c. Statement verifying identity of above copies

| | |
|--|--|
| ACCOMPANYING APPLICATION PARTS | |
| 7. <input checked="" type="checkbox"/> Assignment Papers (cover sheet & document(s)) 8. <input type="checkbox"/> 37 C.F.R. § 3.73(b) Statement <input type="checkbox"/> Power of (when there is an assignee) <input type="checkbox"/> Attorney 9. <input type="checkbox"/> English Translation Document (if applicable) 10. <input checked="" type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input checked="" type="checkbox"/> Copies of IDS Citations 11. <input type="checkbox"/> Preliminary Amendment 12. <input checked="" type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized) <ul style="list-style-type: none"> * Small Entity Statement(s) <input type="checkbox"/> Statement filed in prior application, (PTO/SB/09-12) <input type="checkbox"/> Status still proper and desired <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> (if foreign priority is claimed) <input type="checkbox"/> Other: _____ | |

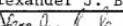
16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

Continuation Divisional Continuation-in-part (CIP) of prior application No: _____

Prior application information: Examiner _____ Group / Art Unit: _____

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

| | | | |
|---|--|-----------|----------------|
| 17. CORRESPONDENCE ADDRESS | | | |
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| | | | |
|-------------------|---|-----------------------------------|----------|
| Name (Print/Type) | Alexander J. Burke | Registration No. (Attorney/Agent) | 40,425 |
| Signature |  | Date | 12/12/98 |

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FEET TRANSMITTAL

Patent fees are subject to annual revision on October 1.

These are the fees effective October 1, 1997.
 Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12.
 See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$ 1,082

METHOD OF PAYMENT (check one)

1. The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit Account 07-0832
 Number
 Deposit Account Name GE & RCA Licensing Mgmt.

Charge Any Additional Fee Required Under Charge the Issue Fee Set in 37 C.F.R. § 1.16 and 1.17 of the Notice of Allowance

2. Payment Enclosed:
 Check Money Order Other

FEE CALCULATION

1. BASIC FILING FEE

| Large Entity | Small Entity | Fee | Fee | Fee | Fee Description | Fee Paid | |
|---------------------|---------------|------------------------|---------------|---------------|-----------------|---------------|--|
| Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | |
| 101 790 | 201 395 | Utility filing fee | | 790 | | | |
| 106 330 | 206 165 | Design filing fee | | | | | |
| 107 540 | 207 270 | Plant filing fee | | | | | |
| 108 790 | 208 395 | Reissue filing fee | | | | | |
| 114 150 | 214 75 | Provisional filing fee | | | | | |
| SUBTOTAL (1) | | (\$ 790) | | | | | |

2. EXTRA CLAIM FEES

| Extra Claims | Fee from below | Fee Paid |
|--------------------------|----------------|----------|
| Total Claims 24 -20* = 4 | X 22 | =\$8 |
| Independent 5 - 3** = 2 | X 120 | = 164 |
| Claims | | |
| Multiple Dependent | | |

*or number previously paid, if greater; For Reissues, see below

| Large Entity | Small Entity | Fee | Fee | Fee | Fee Description |
|---------------------|---------------|--|---------------|---------------|-----------------|
| Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) |
| 103 22 | 203 11 | Claims in excess of 20 | | | |
| 102 82 | 202 41 | Independent claims in excess of 3 | | | |
| 104 270 | 204 135 | Multiple dependent claim, if not paid | | | |
| 109 82 | 209 41 | ** Reissue independent claims over original patent | | | |
| 110 22 | 210 11 | ** Reissue claims in excess of 20 and over original patent | | | |
| SUBTOTAL (2) | | (\$ 252) | | | |

| Complete if Known | | | | | |
|----------------------|--|--|--|--|---------------------|
| Application Number | | | | | To Be Assigned |
| Filing Date | | | | | Herewith |
| First Named Inventor | | | | | Schneidewend et al. |
| Examiner Name | | | | | To Be Assigned |
| Group / Art Unit | | | | | Unknown |
| Attorney Docket No. | | | | | RCA 89,041 |

FEE CALCULATION (continued)

3. ADDITIONAL FEES

| Large Entity | Small Entity | Fee | Fee | Fee | Fee Description | Fee Paid |
|---------------|---------------|--|---------------|---------------|-----------------|---------------|
| Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) | Fee Code (\$) |
| 105 130 | 205 65 | SurchARGE - late filing fee or oath | | | | |
| 127 50 | 227 25 | SurchARGE - late provisional filing fee or cover sheet | | | | |
| 139 130 | 139 130 | Non-English specification | | | | |
| 147 2,520 | 147 2,520 | For filing a request for reexamination | | | | |
| 112 920* | 112 920* | Requesting publication of SIR prior to Examiner action | | | | |
| 113 1,840* | 113 1,840* | Requesting publication of SIR after Examiner action | | | | |
| 115 110 | 215 55 | Extension for reply within first month | | | | |
| 116 400 | 216 200 | Extension for reply within second month | | | | |
| 117 950 | 217 475 | Extension for reply within third month | | | | |
| 118 1,510 | 218 755 | Extension for reply within fourth month | | | | |
| 128 2,060 | 228 1,030 | Extension for reply within fifth month | | | | |
| 119 310 | 219 155 | Notice of Appeal | | | | |
| 120 310 | 220 155 | Filing a brief in support of an appeal | | | | |
| 121 270 | 221 135 | Request for oral hearing | | | | |
| 138 1,510 | 138 1,510 | Petition to institute a public use proceeding | | | | |
| 140 110 | 240 55 | Petition to revive - unavoidable | | | | |
| 141 1,320 | 241 660 | Petition to revive - unintentional | | | | |
| 142 1,320 | 242 660 | Utility issue fee (or reissue) | | | | |
| 143 450 | 243 225 | Design issue fee | | | | |
| 144 670 | 244 335 | Plant issue fee | | | | |
| 122 130 | 122 130 | Petitions to the Commissioner | | | | |
| 123 50 | 123 50 | Petitions related to provisional applications | | | | |
| 126 240 | 126 240 | Submission of Information Disclosure Stmt | | | | |
| 581 40 | 581 40 | Recording each patent assignment per property (times number of properties) | | | | |
| 146 790 | 246 395 | Filing a submission after final rejection (37 CFR 1.129(a)) | | | | |
| 149 790 | 249 395 | For each additional invention to be examined (37 CFR 1.129(b)) | | | | |

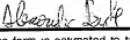
Other fee (specify) _____

Other fee (specify) _____

SUBTOTAL (3) (\$40

* Reduced by Basic Filing Fee Paid

Complete if applicable

| Submitted By | Complete if applicable |
|-----------------------|---|
| Typed or Printed Name | Alexander J. Burke |
| Signature |  |

Reg. Number 40,425

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5 A System for Processing Programs and System Timing Information Derived from Multiple Broadcast Sources

This is a non-provisional application of provisional application serial No. 60/092,616 by D. R. Schneidewend et al., filed July 13, 1998.

Field of the Invention

15 This invention is related to the processing of programs and associated content rating and system timing information received from multiple broadcast sources for program play, recording and playback.

Background of the Invention

In digital video and audio broadcast applications, packetized program information transmitted to a video decoder, such as a High Definition Television (HDTV) receiver, contains broadcast channels, e.g. Fox 5TM, Channel 13TM, from multiple broadcasters. The packetized program information of an individual broadcaster may contain the data content of several program sub-channels occupying the frequency spectrum previously occupied by a single analog broadcast channel. The sub-channels may comprise, for example, digital services including a main program channel, a financial service channel offering stock quotes, a sports news service channel and a shopping and interactive channel, all being conveyed within the 6 MHz bandwidth previously allocated to a single analog NTSC compatible broadcast channel.

35 The packetized program information of an individual broadcaster also contains ancillary information as well as the data content of the program sub-channels. The ancillary information includes system information and program specific data used in identifying and assembling packets comprising selected programs 40 and also includes program guide and text information associated with the transmitted program data. In particular, the ancillary

5 system information includes system timing information providing a time clock reference enabling determination of a time at which a specific program is to be broadcast. The ancillary program specific data may include program content rating information (such as PG-13 etc.) enabling parental control of viewing using a conditional
10 access system such as a V-chip type system, for example. The ancillary system timing and content rating information is typically encoded along with program data to conform to the requirements of a known standard. One such standard detailing an information protocol incorporating system timing and content rating
15 information for broadcast applications is entitled, *Program and System Information Protocol for Terrestrial Broadcast and Cable*, published by the Advanced Television Systems Committee (ATSC), 10 November 1997, hereinafter referred to as the PSIP standard.

20 A number of problems may arise in a digital video system in processing system timing and program specific information from multiple broadcast sources. Specifically, problems arise in the use of the system timing information for scheduling program processing functions and for displaying a current time to a user. Problems also arise in providing a
25 conditional access system that uses accurate program content rating information in authorizing access to programs whilst also providing desirable features such as the ability for a user to optionally override a previously set content rating limit. Thus there is a need to solve these problems and derivative problems.

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Summary of the Invention

35 A system for initiating scheduled program processing functions such as program display, recording or playback, derives a time clock based on a current time reference indication produced by a particular broadcast source. The derived time clock is used in initiating scheduled processing functions for programs derived from the particular broadcast source and time clocks derived from sources other than the particular broadcast source
40 are disregarded. The system may display a second time clock different to the derived time clock.

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Brief Description of the Drawings

In the drawing:

10 Figure 1 is a block diagram of digital video receiving apparatus for processing system timing and program content rating information from multiple broadcast sources, according to the principles of the invention.

15 Figure 2 shows a flowchart for a method for scheduling and executing program processing functions and displaying a time clock, according to the invention.

20 Figure 3 shows a program guide user interface for initiating scheduling of program processing functions, according to the invention.

25 Figure 4 shows a flowchart for a method for conditioning access to programs based on program content ratings received from multiple broadcast sources, according to the invention.

30 Figure 5 shows a method for generating program specific information incorporating system timing and program content rating information, according to the invention.

Detailed Description of the Drawings

35 Figure 1 is a block diagram of a digital video receiving system for demodulating and decoding broadcast signals from multiple broadcast sources, according to the principles of the invention. Although the disclosed system is described in the context of a system for receiving terrestrial broadcast video signals incorporating ancillary program specific and timing information in MPEG compatible format, it is exemplary only. The
40 MPEG data format is widely adopted and detailed in the MPEG2 (Moving Pictures Expert Group) image encoding standard,

5 hereinafter referred to as the "MPEG standard", (ISO/IEC 13818-1, 10th June 1994, and ISO/IEC 13818-2, 20th January 1995). The program specific and timing information may be of a variety of types. For example, it may comply with Program Specific Information (PSI) requirements specified in section 2.4.4 of the
10 MPEG systems standard or it may comply with the previously mentioned PSIP standard or other ATSC standards. Alternatively, it may be formed in accordance with proprietary or custom requirements of a particular system.

15 The principles of the invention may be applied to terrestrial, cable, satellite, Internet or computer network broadcast systems in which the coding type or modulation format may be varied. Such systems may include, for example, non-MPEG compatible systems, involving other types of encoded datastreams and other methods of conveying program specific information.

20 Further, although the disclosed system is described as processing broadcast programs, this is exemplary only. The term 'program' is used to represent any form of packetized data such as audio data, telephone messages, computer programs, Internet data or other communications, for example.

25 In the video receiver system of Figure 1, a broadcast carrier modulated with signals carrying audio, video and associated data representing broadcast program content is received by antenna 10 and processed by unit 13. The resultant digital output signal is demodulated by demodulator 15. The
30 demodulated output from unit 15 is trellis decoded, mapped into byte length data segments, deinterleaved and Reed-Solomon error corrected by decoder 17. The corrected output data from unit 17 is in the form of an MPEG compatible transport datastream containing program representative multiplexed audio, video and
35 data components. The transport stream from unit 17 is demultiplexed into audio, video and data components by unit 22 which are further processed by the other elements of decoder system 100. In one mode, decoder 100 provides MPEG decoded data for display and audio reproduction on units 50 and 55 respectively. In another mode, the transport stream from unit 17 is processed by decoder 100 to provide an MPEG compatible

5 datastream for storage on storage medium 105 via storage device 90.

10 A user selects for viewing either a TV channel (user selected channel-SC) or an on-screen menu, such as a program guide, by using a remote control unit 70. Controller 60 uses the selection information provided from remote control unit 70 via interface 65 to appropriately configure the elements of Figure 1 to receive a desired program channel for viewing. Controller 60 comprises processor 62 and processor 64. Unit 62 processes (i.e. parses, collates and assembles) system timing information and 15 program specific information including program content rating, and program guide information. Processor 64 performs the remaining control functions required in operating decoder 100. Although the functions of unit 60 may be implemented as separate elements 62 and 64 as depicted in Figure 1, they may alternatively be implemented within a single processor. For 20 example, the functions of units 62 and 64 may be incorporated within the programmed instructions of a microprocessor.

25 Controller 60 configures processor 13, demodulator 15, decoder 17 and decoder system 100 to demodulate and decode the input signal format and coding type. Further, controller 60 configures units 13, 15, and 17 for other communication modes, such as for receiving cable television (CATV) signals and for bi-directional communication via coaxial line 14 or for bi-directional (e.g. Internet) communication, for example, via telephone line 11. 30 In an analog video mode, an NTSC compatible signal is received by units 13, 15 and 17 and processed by decoder 100 for video display and audio reproduction on units 50 and 55 respectively. Units 13, 15, 17 and sub-units within decoder 100 are individually configured for the input signal type by controller 60 35 setting control register values within these elements using a bi-directional data and control signal bus C.

40 The transport stream provided to decoder 100 comprises data packets containing program channel data and ancillary system timing information and program specific information including program content rating, and program guide information. Unit 22 directs the ancillary information packets to

5 controller 60 which parses, collates and assembles this information into hierarchically arranged tables. Individual data packets comprising the User selected program channel SC are identified and assembled using the assembled program specific information. The system timing information contains a time
10 reference indicator and associated correction data (e.g. a daylight savings time indicator and offset information adjusting for time drift, leap years etc.). This timing information is sufficient for a decoder to convert the time reference indicator to a time clock (e.g. United States east coast time and date) for establishing a time
15 of day and date of the future transmission of a program by the broadcaster of the program. This time clock is useable for initiating scheduled program processing functions including program play, program recording and program playback, for example. Further, the program specific information contains
20 conditional access, network information and identification and linking data enabling the system of Figure 1 to tune to a desired channel and assemble data packets to form complete programs. The program specific information also contains ancillary program content rating information (e.g. an age based suitability rating),
25 program guide information (e.g. an Electronic Program Guide - EPG) and descriptive text related to the broadcast programs as well as data supporting the identification and assembly of this ancillary information.

30 The program specific and system timing information is assembled by controller 60 into multiple hierarchically arranged and inter-linked tables. An exemplary PSIP compatible hierarchical table arrangement includes a System Time Table (STT), a Master Guide Table (MGT), a Channel Information Table (CIT), Event Information Tables (EITs) and optional tables such as
35 Extended Text Tables (ETTs) and a Rating Region Table (RRT). The STT contains a time reference indicator and associated correction data sufficient for a decoder to establish a time of transmission of a program by a broadcast source accurate to within plus or minus 4 seconds, for example. The MGT contains information for acquiring program specific information conveyed in other tables such as identifiers for identifying data packets associated with the
40

5 other tables. The CIT contains information for tuning and navigation to receive a User selected program channel. The EIT contains descriptive lists of programs (events) receivable on the channels listed in the CIT. The ETT contains text messages describing programs and program channels.

10 The RRT contains program content rating information such as the MPAA (Motion Picture Association of America) or V-chip compatible rating information that is collated by region (e.g. by country or by state within the U.S.A.). Additional program specific information describing and supplementing items within the hierarchical tables is conveyed within descriptor information elements. Information associating a program content rating with a particular program from a particular broadcast source may be conveyed within a content advisory descriptor contained in an EIT or PMT. In other embodiments the system timing and program content rating information associating a specific program with a specific rating may be contained in other tables, data formats, or descriptors such as the caption service descriptor or the information may be conveyed in user definable data. Additional program content ratings are conveyed in vertical blanking intervals in NTSC compatible signals processed by analog processor 27 within decoder 100 in analog video mode. The program specific and system timing information acquired by controller 60 via unit 22 is stored within internal memory of unit 60. Controller 60 uses the acquired content rating and system timing information in conditioning access to programs and in scheduling program processing functions including program viewing, recording and playback.

20 Controller 60 employs the process of Figure 2 to execute scheduled program processing functions including program viewing, recording, and playback. In other embodiments, a process corresponding to the process of Figure 2 (and Figure 4) may be used to execute other scheduled functions including program transmission, program standards conversion, program encryption, decryption, scrambling, decoding and their derivative functions including the termination of any of these processing functions. In executing scheduled processing of a particular

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Controller 60 employs the process of Figure 2 to execute scheduled program processing functions including program viewing, recording, and playback. In other embodiments, a process corresponding to the process of Figure 2 (and Figure 4) may be used to execute other scheduled functions including program transmission, program standards conversion, program encryption, decryption, scrambling, decoding and their derivative functions including the termination of any of these processing functions. In executing scheduled processing of a particular

5 program, controller 60 adaptively generates a scheduling time
clock from a time reference indication (e.g. in the STT) provided
by the broadcast source of the particular program. This generated
scheduling clock is used to time the initiation of scheduled
program processing functions. Previously derived time clocks (e.g.
10 from other broadcast sources) are disregarded in initiating
scheduled processing of this particular program. The scheduling
time clock is re-synchronized to the STT time reference
information provided by a particular broadcast source prior to
15 initiating scheduled processing of any programs produced by that
particular source.

These features address the problem of preventing
application of incorrect program specific information parameters
(parameters within the MGT, CIT, EIT, ETT and RRT etc.) across
program boundaries. This may occur if program processing is
20 scheduled using an inaccurate time clock such as a clock derived
from a broadcast source other than the source of the specific
program to be processed. A time clock inaccuracy of 10 seconds or
more is quite possible under these conditions due to program
broadcasting delays and other delays occurring in a system using
25 multiple broadcast sources.

As a result of this time clock inaccuracy, the wrong
program may be recorded (or viewed or played back) in overlap
periods between initiation or termination of program recording
and the actual broadcast time of the program. Further, a program
30 may be erroneously recorded using the program specific
information parameters of a previously processed program during
program segments occurring in the overlap periods. Consequently,
upon playback of the program, incorrect program specific
parameters are applied during the overlap segments. This may
35 cause faulty decoding including incorrect packet identification and
acquisition or the use of incorrect program content ratings, for
example. As a result, invalid and objectionable images may be
transiently displayed to a user. Under such conditions a portion of
an adult content rated program may be erroneously displayed to a
40 child, for example.

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5 Controller 60 employs the process of Figure 2 to
schedule and execute program processing functions upon user
initiation of a scheduling function. Following the start at step 200,
10 controller 60 in step 203 schedules program viewing (including
tuning and acquisition), recording or playback in response to a
user scheduling command via the program guide interface of
Figure 3 displayed on display 50 (Figure 1). Other embodiments
may employ alternative user interfaces for this scheduling
function.

15 In scheduling program viewing or recording via the
program guide of Figure 3, a user navigates to the desired channel
and program using menu icons 853 and 855. The user selects a
program e.g. news program 849 by highlighting the news icon 849
and schedules the news program 849 for viewing or recording by
selecting icon 805 or icon 810 respectively. A user may similarly
20 schedule playback of a movie such as movie item 847 (Terminator
II) from storage device 90 and medium 105 (Figure 1). The user
schedules playback of the movie by highlighting the movie item
847 and selecting icon 815. In other embodiments a user may
25 schedule program viewing, recording or playback by other
methods such as by using remote unit 70 buttons rather than
program guide icons 805, 810 and 815.

30 Upon user selection of icons 805 or 810 controller 60
stores the scheduled times of broadcast and termination of news
item 849 in internal memory. Controller 60 determines scheduled
times of broadcast and termination of news item 849 from stored
35 program guide information previously derived from the EIT. Upon
user selection of icon 815 controller 60 in conjunction with unit 37
(Figure 1) generates a scheduling menu enabling a user to enter a
time for future playback of movie 847 or to select immediate
playback of the movie. A user selects the control and navigation
icons and enters times etc. using remote control 70 which
supports cursor manipulation (or an alternative cursor based
arrangement such as a mouse or keyboard system).

40 Returning to the process of Figure 2, controller 60 in
step 205 configures units 13, 15 and 17 (Figure 1) and decoder
100 elements to receive packetized program information

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5 containing a user selected program. Controller 60 configures processor 13, demodulator 15 and decoder 17 to receive the specific channel frequency and data format of the transmission channel of the broadcaster of the desired program (previously selected in step 203). In step 210 controller 60 acquires the
10 packets comprising STT data from the broadcast source of the desired program by configuring demultiplexer 22 with the predetermined STT PIDs and table identification data (Table_ID). Thereby controller 60 acquires the STT data containing a current time reference indication and time correction data produced by
15 the broadcast source of the desired program. The STT data is transmitted and acquired at predetermined periodic intervals (recommended by the PSIP standard to be at least once per second).

20 In step 215, in program recording and viewing modes, controller 60 derives a time clock using the acquired STT time reference indication (a value indicating the number of seconds elapsed since a base time, specifically since 12 a.m. January 6, 1980) together with STT correction data including an offset value and daylight savings time indicator (per PSIP standard section
25 6.1). The derived time clock consists of both a date and time and comprises year, month, day and time of day. In deriving the time clock from the time reference indication the following four values are computed:

30 1) Number of minutes from Base = (received seconds from Base)/60
2) Number of hours from Base = (received minutes from Base)/60
3) Number of days from Base = (hours from Base)/24
35 4) Number of years from Base = (days from Base)/(days per year),
where,

days per year = 365, or 366 in a leap year

40 Note,

00000000000000000000000000000000

5 The Base in the above expressions is 12 a.m. January 6,
1980.

From the above four values the derived time clock components, year, month, day and time of day are determined as follows.

1) current year = Base year + number of years from Base,

2) current day of year = number of days from Base - (number of years from Base * days per year),

Also, the current month and day of the month are determined directly from the current year and the current day of year.

3) current hour of day = number of hours from Base - (number of days from Base * 24).

4) current minute of hour = number of received minutes from Base - (number of hours from Base * 60)

25 5) current second within the minute = number of received seconds
from Base - (number of minutes from Base * 60)

Then the derived time clock is the current total time = current year, month, day, hour, minute and second. In addition, the derived time clock is corrected using STT correction data including an offset value and daylight savings time indicator per PSIP standard section 6.1 and Annex A (or by corresponding correction factors in non-PSIP compatible systems).

35 In step 215 in program playback mode, controller 60 uses an internal system clock synchronized with operation of storage device 90 for initiation of movie playback. In other embodiments, controller 60 may derive a scheduling clock from a variety of other forms of time clock data. It is advantageous that the time clock data used to derive the scheduling clock is synchronized with the time clock transmitted by the broadcast source in broadcasting the desired program. This is achieved, for

5 example, by using STT data from the broadcast source of the
desired program in viewing and recording modes and by using a
system clock synchronized with a playback device in playback
mode. STT data and time clocks derived from STT data from
broadcast sources other than the source of the desired program
10 are disregarded in initiating scheduled processing of the desired
program.

In step 220, controller 60 updates (i.e. corrects and resynchronizes) an internally maintained and stored scheduling time clock with the time clock information derived in step 215.

15 The scheduling clock is periodically updated in this manner from derived time clock values obtained from the updated STT data received at intervals of one second or less. In the time intervals between updating the scheduling clock from the STT data the scheduling clock is maintained using an internal crystal derived
20 clock frequency within controller 60. Controller 60 in other embodiments may create and maintain separate scheduling clocks and/or STT derived time reference and correction information associated with each program broadcast source (e.g. one clock for each broadcast source) using the method of steps 205-215. In step
25 220, if no time clock reference information is available from the broadcast source of the desired program, controller 60 uses a previously derived scheduling clock. Controller 60 in step 225 initiates processing of the desired program at the scheduled processing time previously established in step 203. Controller 60
30 determines whether the times for initiating processing (previously scheduled in step 203) have arrived based on the scheduled clock determined in step 220.

Controller 60 in step 225 initiates processing of the desired program for viewing, recording or playback at the scheduled processing time by identifying and acquiring the packets comprising the desired program. Specifically, controller 60 and processor 22 (Figure 1) determine from the CIT the PIDs of video, audio and sub-picture streams in the packetized decoded transport stream input to decoder 100 from unit 17. The video, audio and sub-picture streams constitute the desired program being transmitted on selected channel SC. Processor 22 provides

5 MPEG compatible video, audio and sub-picture streams for to
video decoder 25, audio decoder 35 and sub-picture processor 30
respectively. The video and audio streams contain compressed
video and audio data representing the selected channel SC
program content. The sub-picture data contains the EIT, ETT and
10 RRT information associated with the channel SC program content.

Decoder 25 decodes and decompresses the MPEG compatible packetized video data from unit 22 and provides decompressed program representative pixel data to NTSC encoder 45 via multiplexer 40. Similarly, audio processor 35 decodes the packetized audio data from unit 22 and provides decoded and amplified audio data, synchronized with the associated decompressed video data, to device 55 for audio reproduction. Processor 30 decodes and decompresses sub-picture data received from unit 22.

20 Processor 30 assembles, collates and interprets EIT, RRT, and ETT data from unit 22 to produce formatted program guide data for output to OSD 37. OSD 37 processes the EIT, RRT and ETT and other information to generate pixel mapped data representing subtitling, control and information menu displays
25 including selectable menu options and other items for presentation on the display device 50. The control and information menus that are displayed enable a user to select a program to view and to schedule future program processing functions including a) tuning to receive a selected program for viewing, b) recording of a program onto storage medium 105, and
30 c) playback of a program from medium 105.

The control and information displays, including text and graphics produced by OSD generator 37, are generated in the form of overlay pixel map data under direction of controller 60.

35 The overlay pixel map data from unit 37 is combined and synchronized with the decompressed pixel representative data from MPEG decoder 25 in encoder 45 via multiplexer 40 under direction of controller 60. Combined pixel map data representing a video program on channel SC together with associated sub-picture data is encoded by NTSC encoder 45 and output to device 50 for display.

5 In step 230 (Figure 2), controller 60 generates a
second time clock for presentation to a user such as the displayed
time clock item 857 (also comprising a date) depicted in the
program guide of Figure 3, for example. The second time clock is
different to the scheduling clock and is generated to prevent time
10 change discontinuities that occur in the scheduling clock from
being displayed and from disturbing a user. Controller 60
generates the second time clock a) by filtering the scheduling time
clock values to prevent abrupt discontinuities e.g. by using a low
15 pass filter, or b) by updating the second time clock in periods
when it is not visible to a user. Alternatively, a second time clock
may be used that is independent of the scheduling clock and is a)
based on an internal clock of the controller 60 and decoder 100
system, b) is received on a channel that is separate and distinct
20 from the program content channels, or c) is received embedded
within a composite program guide that lists programs from
multiple broadcast sources, for example. The process of Figure 2
terminates at step 235.

Controller 60 employs the method of Figure 4 to
process packetized program information from different broadcast
25 sources using functionally equivalent program specific
information parameters including program content rating data
dynamically selected from alternative broadcast sources. In
processing packetized program information, controller 60
advantageously adaptively selects a program specific parameter
30 based on the broadcast source of the parameter. The process of
Figure 4 is also applicable to the scheduling of analog video NTSC
compatible programs and to the acquisition and processing of
rating information derived from vertical blanking intervals.

In the exemplary embodiment of Figure 4, controller
35 60 conditions access to programs based on program content
ratings received from multiple broadcast sources that provide
either analog or digital data. Controller 60 conditions access to
programs in response to user commands entered via control and
information menus generated by OSD unit 37 and displayed on
40 unit 50 (as described in connection with Figure 2). The control and
information menus enable a user to enter content rating profiles

5 for himself and others, upon providing entitlement data comprising a userid and a predetermined password, for example. A content rating profile allows a user to set a maximum rating limit threshold for individual users of decoder 100 according to a user selected rating system. A user may select rating limit
10 thresholds according to one of a number of different rating systems such as the V-chip, MPAA, or other systems. Thereby decoder 100 enables parental control over access to broadcast programs by children and others. In addition, the control and information menus enable a user to override a selected preset
15 maximum rating limit upon entry of authorization data such as a userid and password.

In executing the process of Figure 4 and following the start at step 300, controller 60 in step 303 initiates scheduling of program viewing (including tuning and acquisition), recording or playback. Controller 60 initiates scheduling in response to a user scheduling command via the program guide interface of Figure 3 as previously discussed. Controller 60 in step 305 configures units 13, 15 and 17 (Figure 1) and decoder 100 elements to receive composite program guide information from a first broadcast source. The composite program guide information contains program description and other information supporting assembly and decoding of packet data constituting individual programs produced by multiple different broadcast sources. Controller 60 configures processor 13, demodulator 15 and decoder 17 to receive the specific channel frequency and data format of the transmission channel provided by the first broadcast source. Thereby in step 305 controller 60, in conjunction with unit 22, acquires composite program guide information containing program specific information including a program content rating for the desired program from the first broadcast source. Also, in step 305 controller 60 stores the program specific information in internal memory and in step 310 retrieves the content rating of the desired program from a content advisory descriptor contained in an EIT of the stored program specific information. Controller 60 determines the rating system of the retrieved content rating (i.e. whether the desired program is rated according to a V-chip or

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5 MPAA compatible system, for example) from an acquired RRT of the stored program specific information.

In step 315, controller 60 compares the retrieved program content rating with a maximum rating threshold limit contained in a predetermined user specific rating profile. The 10 rating threshold limit determines the maximum program content rating that the present user of the decoder 100 system is authorized to access. If the content rating of the desired program does not exceed the maximum content rating threshold, controller 60 schedules processing of the desired program in step 315. The 15 retrieved program content rating and maximum content rating threshold limit are compatible with a content rating system contained within the previously stored RRT. An exemplary age based rating system is depicted in the program guide of Figure 3 (items 860-872) and comprises TV-M, TV-14, TV-PG, TV-G, TV-Y7, TV-Y ratings.

20 A number of problems may occur in using content ratings from a composite program guide (or another rating information source) in scheduling processing of programs in the manner disclosed in steps 303-315. Specifically, problems may 25 arise because a) the content rating supplied in the composite guide provided by the first broadcast source may be inaccurate, and b) the verification of user authorization performed in step 315 may be rendered invalid for a variety of reasons. The verification may be rendered invalid, for example, because either 30 the program guide limit threshold is subsequently overridden and altered by an authorized user or because of a subsequent re-rating of the content of the desired program.

35 Consequently, controller 60 in step 320 acquires a second content rating of the desired program from program specific information provided by the broadcast source of the desired program. The content rating from this second broadcast source is acquired reasonably close to the time of program broadcast to enable a current and reliable second validation of user authorization to access the desired program. In step 325, 40 controller 60 converts the content rating acquired from the second source (the broadcaster of the desired program) to be compatible

5 with the content rating system used by the first source (the composite guide broadcaster). Controller 60 converts the content rating using predetermined equivalence mapping information for mapping content ratings of one broadcast source to a rating system of another source.

10 In step 330, if the ratings acquired from the first and second broadcast sources are different, controller 60 selects between them. Once selected, the content rating is used in further processing and may be used by controller 60 in step 330 to update an existing different rating such as a rating displayed in

15 the program guide of Figure 3, for example. Controller 60, in step 330, selects a program specific information parameter from the broadcast source deemed to be the most reliable and accurate considering a) the type of parameter being selected (a content rating in this example), and b) the time and stage in the processing scheme at which the parameter is being processed. A program specific information parameter from one broadcast source may be deemed more reliable at a particular point in time than an equivalent parameter from another source. Consequently, parameter selection may be advantageously varied based on the

20 source of the parameter and time and processing stage at which it is acquired. In other embodiments, the rating conversion step 325 may be unnecessary and it may alternatively be used to convert a rating to the system of the second source or to a third and different system. It is advantageous in conditioning access based

25 on program content ratings to select the content rating that: a) is provided from the broadcast source of the desired program, and b) is the most recently acquired rating especially if the rating is acquired substantially close to the time of broadcast of the desired program.

30 In step 335, controller 60 uses the rating selected in step 330 to perform a second validation of user authorization to access the desired program in the manner described in connection with step 315. Specifically, controller 60 compares the retrieved program content rating with the maximum rating threshold limit

35 contained in the predetermined user specific rating profile. Upon successful validation, controller 60 in step 337 initiates processing

40

5 of the desired program by configuring demultiplexer 22 with the
PIDs for identifying and acquiring the packets comprising the
datastreams constituting the desired program. Decoder 100
processes the identified packets of the desired program for
viewing, recording or playback in the manner previously
10 described in connection with Figure 2. The process of Figure 4
terminates at step 340.

15 The process of Figure 4 is also used in conditioning access to analog video programs and in the acquisition and processing of program content ratings derived from the vertical blanking intervals of NTSC compatible analog video signals. Consequently steps 303-320 similarly involve scheduling analog video processing and tuning to analog video sources for deriving content ratings (e.g. V-chip compatible ratings) from NTSC compatible vertical or horizontal blanking intervals. Further, the 20 mapping, selection, validation and processing of steps 325-337 use ratings derived from analog video signal as well as from digital program specific information.

Figure 5 shows a method for generating program specific information incorporating system timing and program content rating information, according to the invention. The method may be employed at an encoder for broadcasting video data such as the data received by antenna 10 of Figure 1 or the method may be employed within a decoder unit such as within controller 60 of Figure 1 in a storage mode, for example.

30 In a storage mode of the system of Figure 1, the corrected output data from unit 17 is processed by decoder 100 to provide an MPEG compatible datastream for storage. In this mode, a program is selected for storage by a user via remote unit 70 and interface 65. Processor 22, in conjunction with controller 60 forms condensed system and program specific information including STT, MGT, CIT, EIT, ETT and RRT data containing the advantageous features previously described. The condensed information supports decoding of the program selected for storage but excludes unrelated information. Controller 60, in conjunction with 35 processor 22 forms a composite MPEG compatible datastream containing packetized content data of the selected program and 40

5 associated condensed program specific information. The composite datastream is output to storage interface 95.

10 Storage interface 95 buffers the composite datastream to reduce gaps and bit rate variation in the data. The resultant buffered data is processed by storage device 90 to be suitable for storage on medium 105. Storage device 90 encodes the buffered datastream from interface 95 using known error encoding techniques such as channel coding, interleaving and Reed Solomon encoding to produce an encoded datastream suitable for storage. Unit 90 stores the resultant encoded datastream incorporating the 15 condensed program specific information on medium 105.

20 An encoder employs the method of Figure 5 for generating system and program specific information including STT, MGT, CIT, EIT, ETT and RRT data and descriptors for each broadcaster and for combining the information in a composite datastream. The generated information may be transmitted to a 25 decoder system such as the system of Figure 1 for reception by antenna 10 and subsequent decoding as previously described for example. Following the start at step 400 of Figure 5, STT, MGT, CIT, EIT, ETT and RRT data and descriptors for each broadcaster is generated in steps 405 and 410. Specifically, a CIT is generated in step 405. The CIT contains channel and program identification information enabling acquisition of available broadcast programs and channels produced by an individual broadcaster. The CIT incorporates channel identification numbers and packet identifiers 30 for identifying individual packetized datastreams that constitute individual programs to be transmitted on particular channels. The generated CIT also incorporates items linked to listed program channels including a program number, a language code indicator, and a stream type identifier, as previously described in connection with Figure 1.

35 In step 410, an EIT is generated containing program guide information including descriptive lists of programs (events) receivable on the channels listed in the CIT. The EIT is generated to include a content advisory descriptor containing program content ratings selected and processed from rating information 40 provided by multiple broadcast sources in the manner described

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5 in connection with Figure 4. The EIT associates a specific program
with a specific rating. An ETT and an RRT are also generated in
step 410. The ETT contains text messages describing programs, for
example, and the RRT contains program content rating information
for various rating systems as previously described. In step 410,
10 an MGT is also generated containing data identifiers enabling the
identification and assembly of CIT, EIT, and RRT information. The
MGT also conveys table size information for the previously
generated CIT, EIT, ETT and RRT. An STT is also generated in step
15 410 containing a time reference indicator and associated
correction data sufficient for a decoder to establish a time of
transmission of a program by the program broadcaster.

In step 415, the STT, MGT, CIT, EIT, ETT and RRT data
and descriptors generated for each broadcaster in steps 405 and
20 410 are formed into composite system and program specific
information for multiple broadcast sources. The composite system
and program specific information is advantageously formed to
associate individual STT time references with their corresponding
broadcast sources. In step 420, the composite information
25 produced in step 415 is combined with video and audio program
representative components for multiple channels and is formatted
into a transport stream for output. In step 423, the output
transport stream is further processed to be suitable for
transmission to another device such as a receiver, video server, or
30 storage device for recording on a storage medium, for example.
The processes performed in step 423 include known encoding
functions such as data compression Reed-Solomon encoding,
interleaving, scrambling, trellis encoding, and carrier modulation.
The process is complete and terminates at step 425. In the process
35 of Figure 5, multiple CIT, EIT, ETT and RRT tables may be formed
and incorporated in the program specific information in order to
accommodate expanded numbers of channels.

The architecture of Figure 1 is not exclusive. Other
40 architectures may be derived in accordance with the principles of
the invention to accomplish the same objectives. Further, the
functions of the elements of decoder 100 of Figure 1 and the
process steps of Figures 2, 4 and 5 may be implemented in whole

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

5 or in part within the programmed instructions of a microprocessor. In addition, the principles of the invention apply to any form of MPEG or non-MPEG compatible electronic program guide. A datastream formed according to the invention principles may be used in a variety of applications including video server or
10 PC type communication via telephone lines, for example. A program datastream with one or more components of video, audio and data formed to incorporate system and program specific information according to invention principles may be recorded on a storage medium and transmitted or re-broadcast to other
15 servers, PCs or receivers.

5 What is claimed is:

1. A system for initiating scheduled program processing functions for use in a video decoder receiving packetized program information from different broadcast sources, 10 said packetized program information from an individual broadcast source containing program content, system timing and program specific information data, comprising:
 - selection means for selecting a desired program produced by a broadcast source;
 - 15 means for tuning to receive packetized program information containing said program; and
 - a processor for identifying and acquiring system timing data comprising a current time reference indication provided by said broadcast source in said packetized program information wherein
- 20 said processor derives a time clock based on a current time reference indication produced by a particular broadcast source and uses said derived time clock in initiating scheduled processing functions for programs derived from said particular broadcast source.
- 25
2. A system according to claim 1 wherein, in initiating scheduled processing functions
30 said processor disregards a time clock derived from a current time reference indication produced by a source other than said particular broadcast source.
3. A system according to claim 1, wherein
35 said processor updates a stored scheduling time clock with a clock value derived from a current time reference indication produced by said particular broadcast source prior to using said scheduling time clock in initiating scheduled processing functions for programs derived from said particular broadcast source.

5 4. A system according to claim 1, wherein in the absence of a valid current time indication being available from said particular broadcast source
10 said processor initiates scheduled processing functions using a clock value derived from a current time reference indication produced by a source other than said particular broadcast source.

15 5. A system according to claim 1, wherein
15 said processor derives a second time clock for display to a user and said second time clock is different to said derived time clock used in initiating scheduled processing functions for programs.

20 6. A system according to claim 5, wherein
20 said second time clock is a filtered time clock to prevent a user from seeing an abrupt time change discontinuity.

25 7. A system according to claim 5, wherein
25 said second time clock is updated during periods when said second time clock is not displayed to prevent a user from seeing an abrupt time change discontinuity.

30 8. A system according to claim 5, wherein
30 said second time clock is updated using current time reference indications independently of the broadcast source of said current time reference indications.

35 9. A system according to claim 5, wherein
35 said second time clock is updated using current time reference indications from a single source.

40 10. A system according to claim 1, wherein
40 said processor initiates a scheduled processing function in response to a user selection made via a displayed electronic program guide.

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5 11. A system according to claim 1, wherein
 said processor initiates scheduled processing functions
including at least one of, a) program recording, b) program
playback and c) program selection and display.

10 12. A system according to claim 1, wherein
 said tuning means tunes to receive said packetized
program information transmitted on a particular RF transmission
channel carrier frequency used by said particular broadcast
source, and

15 13. A method for identifying and acquiring system timing
data provided by said particular broadcast source using a) a data
identifier and b) a table identifier.

20 14. A method for forming composite program guide
information from program guide information received from a
plurality of different broadcast sources, said program guide
information from an individual broadcast source containing
system timing data comprising a current time reference indication
provided by said individual broadcast source, comprising the
25 steps of:
 forming channel map information including at least
one identification number for use in identifying a broadcast
channel and for associating said broadcast channel with a
broadcast source;

30 15. A method for forming composite program guide information
incorporating said channel map information and
current time reference indications produced by a plurality of
broadcast sources into said composite program guide information;

35 16. A method for forming composite program guide information
 associating a particular current time reference indication with a
particular individual broadcast source; and
 incorporating said composite program guide
information into packetized data for output to a transmission
channel.

5 19. A system according to claim 18, wherein
said second time clock is embedded in the content of
said dedicated program guide channel.

10 20. A system according to claim 18, wherein
said second time clock is presented in said displayed
electronic program guide.

15 21. A method for initiating scheduled program
processing functions for use in a video decoder receiving
packetized program information from different broadcast sources,
said packetized program information from an individual broadcast
source containing program content, system timing and program
specific information data, comprising the steps of:

20 tuning to receive packetized program information
containing a desired program produced by a broadcast source;
identifying and acquiring system timing data
comprising a current time reference indication received from said
broadcast source in said packetized program information;
25 deriving a time clock based on a current time
reference indication produced by a particular broadcast source;
and
initiating scheduled processing functions for programs
from said particular broadcast source using said derived time
clock.

30 22. A method according to claim 21 including the step
of
disregarding a time clock derived from a current time
reference indication produced by a source other than said
particular broadcast source.

35 23. A system according to claim 21, wherein said
initiating scheduled processing functions step comprises
initiating a function including at least one of, a)
40 program recording, b) program playback and c) program tuning
and display.

25

Abstract

A system for initiating scheduled program processing functions such as program display, recording or playback, derives a time clock based on a current time reference indication 10 produced by a particular broadcast source. The derived time clock is used in initiating scheduled processing functions for programs derived from the particular broadcast source and time clocks derived from sources other than the particular broadcast source are disregarded. The system displays a second time clock different 15 to the derived time clock. In addition, the system forms a composite program guide from data from multiple broadcast sources to associate current time reference indications with their corresponding broadcast sources.

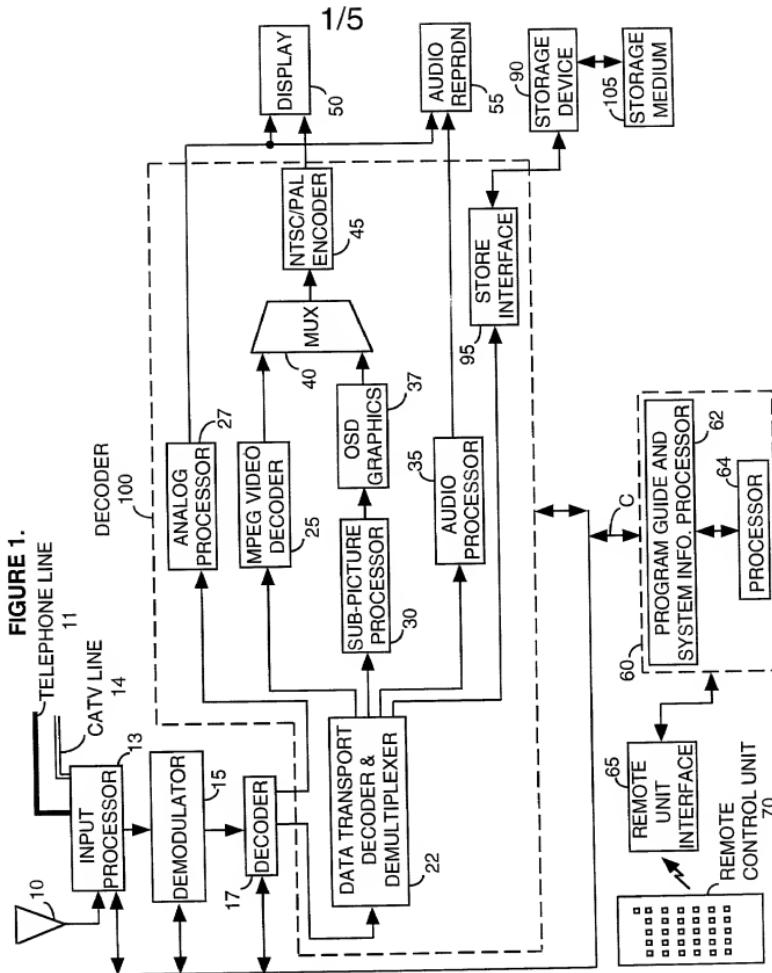


FIGURE 2

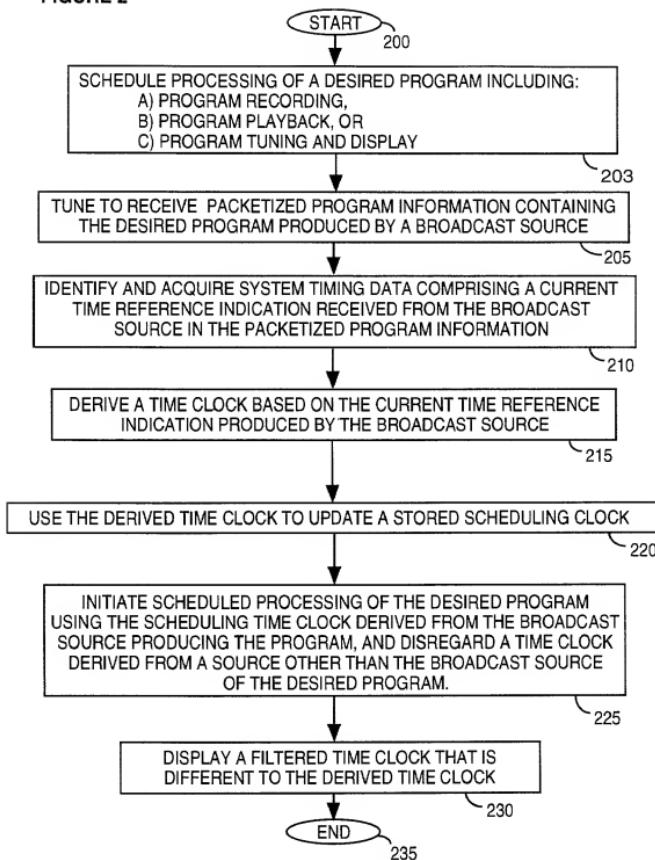
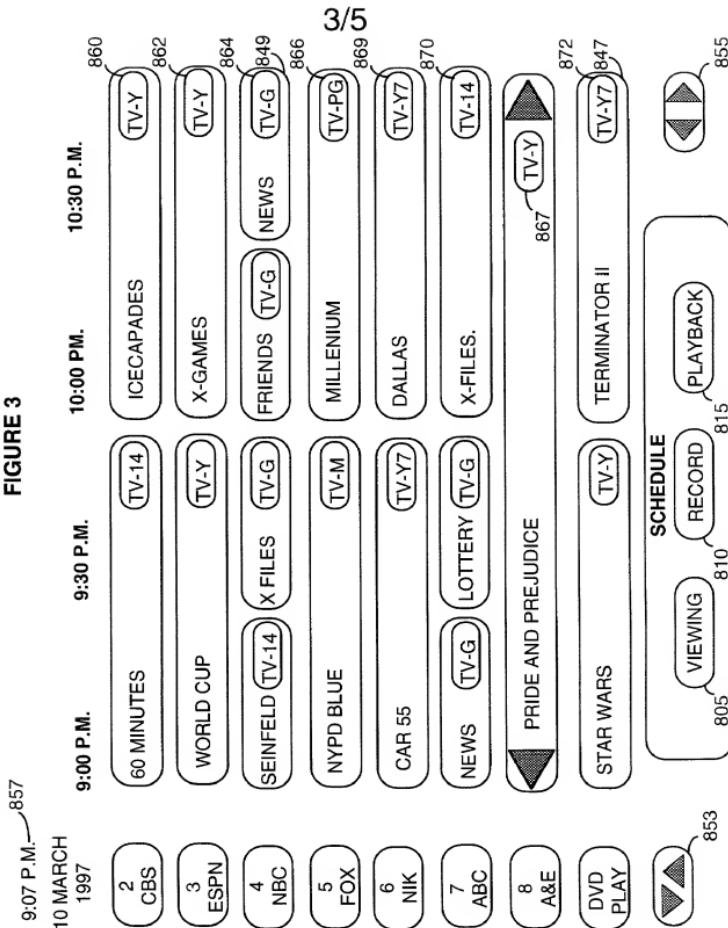


FIGURE 3



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FIGURE 4

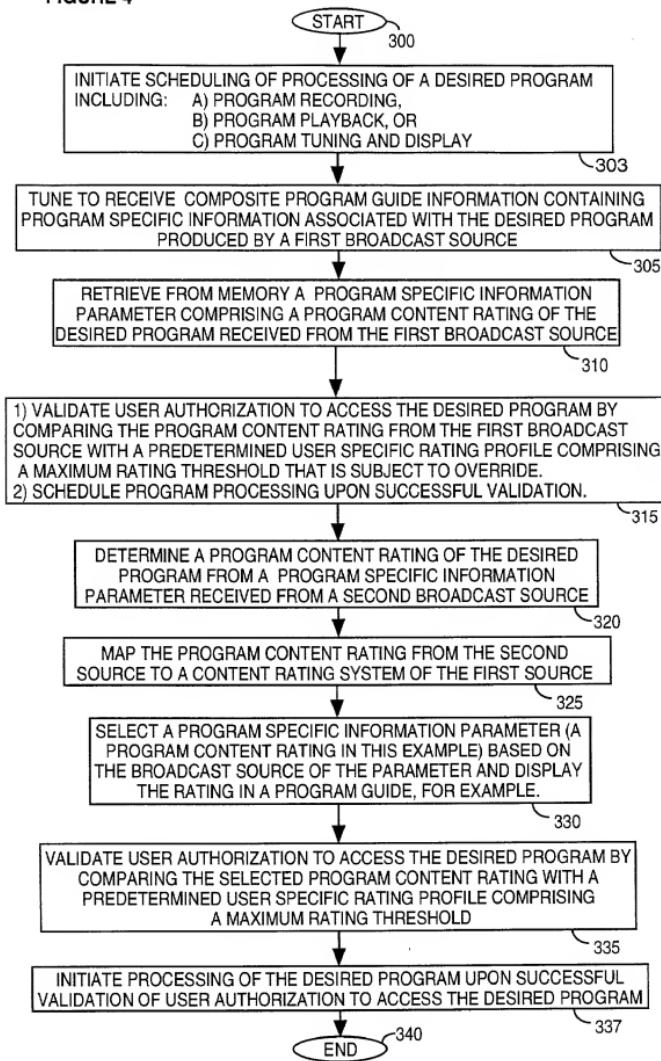
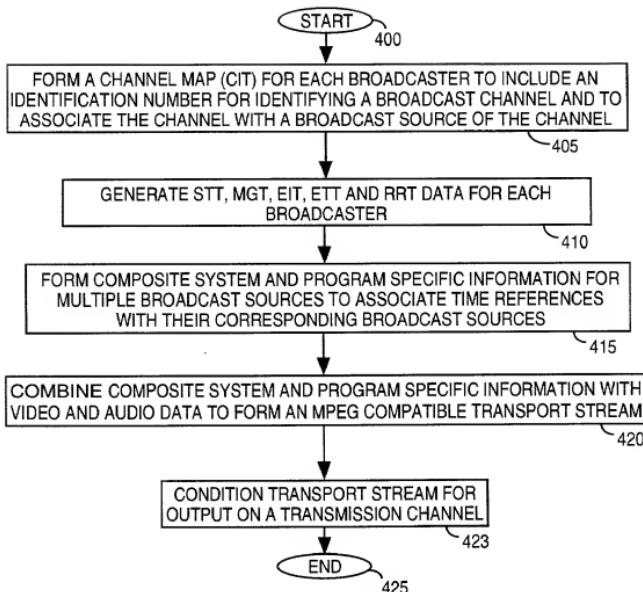


FIGURE 5



DECLARATION AND POWERS OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **A SYSTEM FOR PROCESSING PROGRAMS AND SYSTEM TIMING INFORMATION DERIVED FROM****MULTIPLE BROADCAST SOURCES**

the specification of which was filed on _____ as Application Serial No. _____ and was amended on _____, or, if not identified here by filing date and serial number, is attached hereto.

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate by me or my representatives or assigns for this invention having a filing date before that of the application on which priority is claimed.

Application No. _____ in _____ on _____ priority claimed [] Yes [] No

Application No. _____ in _____ on _____ priority claimed [] Yes [] No

Application No. _____ in _____ on _____ priority claimed [] Yes [] No

I hereby claim the benefit under 35 USC 119(e) of any United States provisional application(s) as listed below.

Application No. 60/092,616 Filed July 13, 1998

Application No. _____ Filed _____

I hereby claim the benefit under 35 USC 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose material information as defined in 37 CFR 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application

Serial No. _____ Filed _____ [] patented [] pending [] abandoned

Serial No. _____ Filed _____ [] patented [] pending [] abandoned

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint, individually and collectively, the following as my/our attorney or agent with full power of substitution and revocation, to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith:

| | | |
|--------------------|-------------------------|-----|
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| Eric P. Herrmann | Registration No. 29,169 | and |
| Ronald H. Kurdyla | Registration No. 26,932 | and |
| Alexander J. Burke | Registration No. 40,425 | |

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| Residence | | |